Observations on Some Jewel Beetles (Coleoptera:Buprestidae) From The Armidale District, North-eastern New South Wales.

By T. J. Hawkeswood*

Introduction

The Buprestidae are commonly known as "jewel beetles" and they are most abundant in the tropics (e.g. Britton, 1970; Gray, 1974; Hawkeswood, 1980). Despite the large number of species in the family, which Britton (1970) has estimated to be about 15,000, little is known about their general biology, and in particular, adult behaviour, feeding and flight biology, and relative importance in the pollination of flowers. In Australia, despite it being regarded as one of the headquarters for the family (Tillyard, 1926) and having about 800 species (Carter, 1929; Britton, 1970), almost nothing is known about the distribution, ecology and life histories of buprestids, although taxonomic work is still proceeding (e.g. Barker, 1975; Levey, 1978). This is in contrast to the situation in other places such as the United States of America where ecological studies have been undertaken in conjunction with taxonomic work (e.g. Hespenheide, 1969; 1973; 1976; Nelson & Westcott, 1976; Westcott & Verity, 1977; Westcott *et al*, 1979). This situation has changed somewhat in Australia with the appearance of papers by Williams (1977), Hawkeswood (1978; 1980; 1981) and Peterson & Hawkeswood (1980).

Further observations and notes are provided on four sympatric species, *Stigmodera (Castiarina) inflata* Barker, *S. (C.) oblita* Carter, *Curis caloptera* (Boisduval) and *C. splendens* Macleay from the Armidale area, North-eastern New South Wales.

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Observations

On 22 February, 1978, a visit was made to Dangars Falls, some 24 km ESE of Armidale, North-eastern New South Wales (30°41¹S, 151°44¹E), during 1245-1350 hrs (Temp. 23°C-26°C). Numerous individuals of a black and yellow buprestid, *Stigmodera (Castiarina)* species were collected from five flowering bushes of *Bursaria spinosa* Cav. (Pittosporaceae) growing on the edge of a high cliff near the falls proper and in a creek bed near the top of the falls. Some of the beetles were soft indicating that they had recently emerged from pupae. This buprestid proved to be undescribed and was later named *Stigmodera (Castiarina) inflata* by Barker (1980) and is only known from the specimens collected by the author (and B. J. Hawkeswood) from Dangars and Bakers Creek Falls, in the Armidale district (Fig. 1). Another buprestid, *Curis splendens* Macleay (Fig. 2) was associated with *S. inflata* on *Bursaria spinosa* flowers, but in smaller numbers. No other buprestids were observed. Large numbers of flies, wasps and cockchafer beetles were also observed sharing the feeding niche on flowers of the *Bursaria*.

Visits to Dangars Falls were again made on 17 September, 1 October, 9, 16 November, 9, 25 December 1978, 14, 20 January and 8-14 February 1979, but *S. inflata* was only collected on 10-14 February 1979, during the peak flowering phase of *B. spinosa*. This buprestid appeared to be present in fewer numbers than at the same period the previous season. *Curis splendens* was also commonly present during the flowering of *B. spinosa*.

On 23 February, 1978, a visit was made to the Bakers Creek Falls lookout (30°35'S, 151°48'E) where large numbers of *S. inflata* were observed feeding and resting on *Bursaria spinosa* flowers. There was a slight breeze blowing, the weather was overcast and the temperature was 22°C during the course of observations (1320-1530 hrs, EST). *Stigmodera inflata* was the dominant insect species on the blossoms, and was present in much larger numbers than observed at Dangars Falls on 22 February, 1978. During the course of observations, *Curis splendens* Macleay, *Stigmodera (Castiarina) oblita* Carter and one specimen of *Curis caloptera* (Boisduval) were noticed on the flowers. *Bursaria spinosa* was growing in a comparatively large stand near and on the edge of a cliff in two semi-cleared paddocks with *Eucalyptus* species, *Jacksonia scoparia* R.Br., herbaceous annuals and various grasses. About 42 *Bursaria* plants were counted in the area, but only 18 (43.3%) were flowering. All these were examined and the numbers of *S. inflata* and *C. splendens* (the most common buprestids) were recorded (Table 1). In some cases, large bushes (1.0-1.5 m high) were at the stage of peak flowering and nectar production was high. Since these bushes offered abundant and easily accessible food, large numbers of nectar-feeding *S. inflata* were attracted to the blossoms (Table 1). Although accurate counts were unable to be made due to some beetles movements from place to place during counting and the large numbers present, an estimate has been made for these plants (i.e. plants 7, 8, 10, Table 1). Fortunately, in other instances, beetles were present in lower numbers, so that the counting of individuals more than once on a particular plant, was minimal. No beetles were found on poorly flowering or non-flowering plants (Table 1) (i.e. plants in these two categories were usually young plants < 1m high). Both buprestids *(S. inflata* and *C. splendens)* favoured the large, profuse flowering bushes (Table 1). Up to 8 beetles at a time were either feeding or resting on a panicle of flowers (i.e. a group of 20-40 flowers).

Table 1. Abundance of *S. inflata* Barker* and *Curis splendens* Macleay* on flowers of *Bursaria spinosa* Cav. at Bakers Creek Falls, north-east New South Wales on 23 February, 1978.

Plant No.	No. of buprestids		Plant No.	No. of buprestids	
	S. inflata	*C. splendens*		*S. inflata*	*C. splendens*
+ 1	0	0	10	c.75	5
2	18	2	11	15	2
3	10	1	12	22	3
4	19	2	13	4	0
5	8	0	14	12	1
6	12	2	15	1	0
7	c.90	8	+16	0	0
8	c.60	6	+17	0	0
9	5	0	18	22	2

Total: c. 360 *S. inflata*. Average/plant = c.20
34 *C. splendens*. Average/plant = c.2

* Voucher specimens of both species are housed in the South Australian Museum (SAM).

\+ Poorly flowering plant.

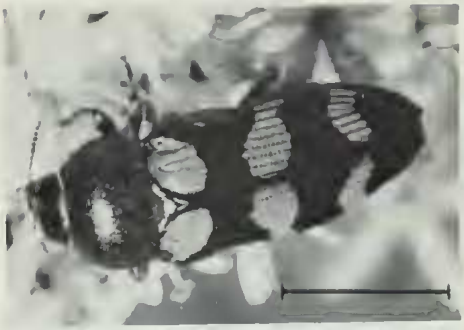

Fig. 1. *Stigmodera (Castiarina) inflata* on flowers of *Bursaria spinosa*, at Dangars Falls, North-east New South Wales, 22 Feb. 1978. Bar indicates 5 mm. (Photograph by B. J. Hawkeswood).

Fig. 2. *Curis splendens* on flowers of *Bursaria spinosa*, at Bakers Creek Falls, North-east New South Wales, 23 Feb. 1978. Bar indicates 5 mm. (Photograph by B. J. Hawkeswood).

The most interesting aspect of the behaviour of *S. inflata* was the distinct but dull whirring noise made in flight, presumably derived from beating the wings against the elytra (wing-cases) and/or body. This whirring sound resembled a large hive-bee in flight. Periods spent in flight were generally small (2-25 seconds). Beetles usually flew for short distances from one group of flowers to another on the same plant. Nearest-neighbour flights to adjacent plants also occasionally occurred. No escape mechanisms were displayed until the author gently shook a branch which induced only two beetles (from a total of 15 on the branch) to undergo thanatosis (i.e. "free-fall and death feign", see Hawkeswood, 1978).

The aggregative behaviour of *S. inflata* on blossoms of the foodplant, is typical of many other nectar-feeding species (Hawkeswood, 1975-80, pers. obs.). However, in this case, *S. inflata* was the only species dominant. This is in contrast to other areas, e.g. the Blue Mountains, N.S.W., where up to 15 species of Buprestidae may be found on the one foodplant, and a high percentage (c. 60%) may be common on blossoms (Hawkeswood, 1978). As mentioned previously, other insects, e.g. flies, wasps and cockchafers, were also common visitors to flowers at Dangars Falls, but at Bakers Creek Falls, only a small number of flies were noticed on blossoms. About 0.5 km further along the road leading to the highway to Armidale, five *Bursaria* plants were examined on the same day. Although no buprestids were observed, large numbers of flies, wasps, cockchafers and butterflies were present. Almost all populations of *B. spinosa* were examined for insect vectors during 1975-79 in the Armidale district. Only at Bakers Creek and Dangars Falls, were *S. inflata* found. It would appear then that populations of *S. inflata* at Bakers Creek Falls are very localized at present, and the large numbers of this buprestid on *Bursaria* flowers probably excludes most other insects from visiting flowers on these plants.

Stigmodera inflata possesses typical warning coloration i.e. yellow fasciae (bands) on a black background. It is possible that there is an evolutionary tendency for this species to mimic bees and/or banded wasps, both in colour pattern and sound. The predators of *S. inflata* in the Armidale area are unknown. Hawkeswood (1978) and Peterson and Hawkeswood (1980) have suggested that birds (e.g. magpies and butcherbirds) are the most likely predators of buprestids. If this is the case, then such aggregations of *S. inflata* feeding synchronously on *B. spinosa* (coupled with warning colora-

tion and mimicry) may be important in reducing predation pressures, and allow beetles better chances of finding partners for breeding purposes in order to maintain a large population size.

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